STATE OF CALIFORNIA
STANDARD AGREEMENT
STD 213 (Rev 06/03)

AGREEMENT NUMBER	
10-C0086	
REGISTRATION NUMBER	
1117026	

1. This Agreement is entered into between the State Agency and the Contractor named below:

STATE AGENCY'S NAME
Department of Pesticide Regulation (DPR)

CONTRACTOR'S NAME
The Regents of the University of California

2. The term of this Agreement is: December 10, 2010 or upon final approval by the State, whichever occurs later through May 31, 2012

3. The maximum amount of this Agreement is: **$20,000.00 Twenty thousand dollars and no cents**

4. The parties agree to comply with the terms and conditions of the following exhibits which are by this reference made a part of the Agreement.

Exhibit A – Scope of Work	7 Pages
Exhibit B – Budget Detail and Payment Provisions	3 Pages
Exhibit C* – General Terms and Conditions (GIA 610)	
Exhibit D - Special Terms and Conditions	1 Page
Exhibit E – Additional Provisions	1 Page

Items shown with an Asterisk (*), are hereby incorporated by reference and made part of this agreement as if attached hereto. *These documents can be viewed at* http://www.ols.dgs.ca.gov/Standard+Language/default.htm

IN WITNESS WHEREOF, this Agreement has been executed by the parties hereto.

CONTRACTOR

CONTRACTOR'S NAME *(If other than an individual, state whether a corporation, partnership, etc.)*
The Regents of the University of California

BY *(Authorized Signature)* — DATE SIGNED *(Do not type)*: 12/16/10

PRINTED NAME AND TITLE OF PERSON SIGNING
JYL BALDWIN
ASSOCIATE DIRECTOR
SPONSORED PROJECTS OFFICE

ADDRESS
2150 Shattuck Avenue, Suite 313
Berkeley, CA 94704-5940

STATE OF CALIFORNIA

AGENCY NAME
Department of Pesticide Regulation

BY *(Authorized Signature)*: Samantha Lewis — DATE SIGNED *(Do not type)*: 12/23/10

PRINTED NAME AND TITLE OF PERSON SIGNING
Samantha Lewis, Business Services Manager

ADDRESS
1001 I Street, Sacramento, CA 95814

California Department of General Services Use Only

☒ Exempt per:
Delegation Letter 74.4

EXHIBIT A
STANDARD AGREEMENT

SCOPE OF WORK

1. The Regents of the University of California, hereinafter referred to as UCB or Contractor, shall perform research for the Department of Pesticide Regulation, hereinafter referred to as DPR or Department.

2. This Agreement will commence on the start date December 10, 2010 as presented herein or upon final approval by the State, whichever is later and no work shall begin before that time. This Agreement is of no effect unless approved by the State. Contractor shall not receive payment for work performed prior to approval of the Agreement and before receipt of notice to proceed by the Contract Manager. This Agreement shall expire on May 31, 2012. The services shall be provided during normal working hours.

3. The Project Representatives during the term of this Agreement will be:

   A. All official communications, except invoices, from the Contractor to DPR shall be directed to the attention of the DPR Contract Manager, Xin Deng, Ph.D., at:

Department of Pesticide Regulation
Environmental Monitoring Branch
Surface Water Program , MS-3B
1001 I Street
P.O. Box 4015
Sacramento, CA 95812-4015

Phone 916-445-2506 Fax 916-324-4088
E-mail: xdeng@cdpr.ca.gov

B. All invoices from the Contractor to DPR shall be directed to:

Department of Pesticide Regulation
Attn: Accounts Payable
P.O. Box 4015, MS 4A
Sacramento, CA 95812-4015

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C. All programmatic communications from DPR to the Contractor shall be directed to the attention of Dr. Donald Weston at:

Dr. Donald Weston
University of California
3060 Valley Life Sciences Bldg.
Berkeley, CA 94720-3140

Phone 925-528-9804 Fax 510-665-6729

E-mail: dweston@berkeley.edu

D. All administrative communications, except payments, from DPR to the Contractor shall be directed to the attention of Jyl Baldwin at:

Sponsored Projects Office
University of California, Berkeley
2150 Shattuck Avenue, Suite 313
Berkeley, CA 94704-5940

Phone 510-642-0120 Fax 510-642-8236

E-mail: spoawards@berkeley.edu

E. All payments from DPR to the Contractor shall be directed to:

The Regents of the University of California
Extramural Funds Accounting
Attn: Lori Cripps
2195 Hearst Avenue, Room 130
Berkeley, CA 94720-1103

Phone 510-642-1371 Fax 510-666-2559

F. The project representatives during the term of this Agreement may be changed by mutual written agreement of the parties without the necessity of an amendment to the Agreement.

4. The Contractor will collect and analyze data on "pyrethroid pesticides in municipal wastewater: sources, treatment effectiveness, effluent quality, and receiving water monitoring" for the Department's Surface Water Program.

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5. Background and Goals

Although pyrethroid insecticides have been used for decades, they have only recently become the dominant insecticide used in urban environments following the ban on chlorpyrifos and diazinon from urban usage in the early 2000s. At present nearly all insecticides available to retail consumers are pyrethroids, and they are also the dominant class used around homes and commercial establishments by professional pest control firms. There are about a dozen pyrethroids commonly used, though permethrin is the one used in greatest quantity. In California, commercial pyrethroid usage exceeds 340,000 kg (2008 data; excludes retail sales), and the amounts used for non-agricultural, largely urban, purposes is at least 50% greater than that used by agriculture.

Recent UCB work on pyrethroids from a variety of Delta sources (Weston and Lydy, 2010) has shown that pyrethroids are present in the effluent of secondary-treated municipal wastewater, they are present in 100% effluent at concentrations above known LC_{50}s for the test organism, Hyalella azteca, and Toxicity Identification Evaluation work has implicated them at least in part as contributors to observed H. azteca toxicity. Data are only available from three facilities, but among the locations evaluated, there is substantial variation in the frequency of pyrethroid detection, the specific pyrethroid present, and toxicity.

Existing data provide sufficient basis to show pyrethroids are passing through at least secondary treatment systems, and that they can contribute to mortality in test organisms when conducting toxicity tests of the effluent. But given the few sites tested, and the limited sampling at each site, we lack information on the source of pyrethroids to these systems, the physical/chemical mechanisms by which the compounds move through the treatment process, and the extent of pyrethroid removal attained. To address these issues, we will pursue the studies listed below, focusing on the secondary treatment facility in Elk Grove, California operated by the Sacramento Regional County Sanitation District (SRCSD).

6. Work to Be Performed

Note: The work described below will be jointly funded by DPR and the Sacramento County Regional Sanitation District (SCRSD). Funding from both sources, $20,000 and $22,799, respectively, will be used to perform the work described below. Complementary work being performed concurrently at the SCRSD Treatment Plant by the University of California, Davis and Southern Illinois University is not included in the tasks described below and is funded by SCRSD, independent of the funding for tasks described in this Agreement.

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A. Task 1 - Influent Characterization

1. Pyrethroid mitigation efforts are stymied by the fact that the dominant source(s) of the compounds to municipal waste streams are not known. For example, it is unclear if the pyrethroids are originating through drain disposal such as laundering of pyrethroid-treated fabrics, human or pet pest control products that are drain disposed, direct application of pyrethroids to floor drains in commercial establishments, or improper disposal of unwanted household pesticides. Alternatively, the primary source could be inflow and infiltration to the sanitary sewage system (e.g., entry around manhole covers, seepage into pipes from surrounding saturated ground). Also, some municipalities, such as Sacramento have systems that, by design, carry both sanitary and storm water flow in portions of the service area.
2. To guide mitigation measures aimed at reducing entry of pyrethroids into municipal wastewater systems, we propose to characterize the pyrethroids in the waste stream as it enters the treatment plants. Monthly sampling of influent over a 12-month period is planned, with three of the sampling events to be rain-dependent so as to characterize influent quality during the high flows accompanying winter runoff. If possible we will use the 24-h composite influent sampler operated by SRCSD. Should sample volume be insufficient, or logistical considerations prevent obtaining composites, grab samples will be taken. The resulting temporal patterns and relative concentrations of the various pyrethroid compounds should be useful in inferring sources. For example certain pyrethroids (e.g., cypermethrin) are typical of professional applications rather than those by homeowners. Temporal data would be useful in quantifying the relative importance of drain disposal versus storm water runoff, since the latter would obviously be a significant portion of the flow only after rain events.
3. Additional information on sources can be gained by sampling of the various main interceptors throughout the collection network. This approach may allow us to relate pyrethroid concentrations to land uses within the service area of each interceptor (for example, the relative importance as a pyrethroid source of that portion of the service area with combined sanitary and storm sewers, or the pyrethroid composition of commercial versus residential areas). A maximum of five interceptors will be sampled, with locations to be determined in consultation with SRCSD staff. Sampling will be conducted on two occasions; once during the dry season and once during a winter rain event.
4. Samples will be shipped to Southern Illinois University (SIU) for analysis of pyrethroid pesticides, with costs for these analyses supported by funding directly from the Sanitation District to SIU.

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B. Task 2 - Pyrethroid Removal Efficiency

1. Pyrethroid content of wastewater will be followed through the treatment system in order to quantify the removal efficiency of each treatment step. The wastewater entering the treatment plant will already be characterized under Task 1, and additional Task 2 samples will be taken after the primary clarifiers, mid-secondary treatment after the carbonaceous oxygen tanks (waste stream known as mixed liquor), and of final effluent after secondary clarification and chlorination/dechlorination (known as dechlorinated final effluent, or DFE). SRCSD operates 24-h compositing samplers at most of these locations and these samples will be utilized if suitable, as noted above. Grab samples will be taken if necessary. Should it not be possible to quantify pyrethroids in the effluent of the carbonaceous oxygen tanks because of interferences with other substances in the waste stream, that sampling site will be replaced by samples taken after secondary clarification but before chlorination/dechlorination. To the extent logistical considerations allow, we will attempt to stagger the samples in time based on residence time within each treatment unit, so that approximately the same water mass is followed through the plant. Pyrethroid losses would be quantified after each treatment unit on six occasions. Three sampling events will occur during or immediately after a winter rain, and three will occur during the dry season. In all cases, sampling will occur at the same time as Task 1 influent samples so as to utilize those data and avoid the need for additional influent samples. Ancillary data to be collected with all pyrethroid samples include total suspended solids (TSS), volatile suspended solids (VSS), particulate organic carbon (POC), and dissolved organic carbon (DOC).
2. Samples will be shipped to Southern Illinois University (SIU) for analysis of pyrethroid pesticides, with costs for these analyses supported by funding directly from the Sanitation District to SIU.

C. Task 3 - Effluent Toxicity and Receiving Water Monitoring

1. The dechlorinated final effluent will be used for toxicity testing with H. azteca on the same six sampling occasions (three dry season samples and three wet season samples) discussed in Tasks 2. Concurrent chemistry data useful for interpreting the toxicity results will be available as discussed in the previous tasks. Testing protocols will follow those described in Weston and Lydy (2010), and are comparable to standard EPA procedures for freshwater acute toxicity tests (USEPA, 2002). Briefly, the test will be of 96-h duration, include a dilution series of effluent in lab water (100, 50, 25, 12.5, and 6.25%), and with feeding and water change on the second day. At test completion both mortality and paralysis are scored.
2. We will interpret toxicity results in light of the distribution of pyrethroids between particulate and dissolved phases, as determined in complementary UC Davis

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studies being conducted concurrently. Establishing the proportion of pyrethroid in the most bioavailable freely dissolved phase may be possible through distribution coefficients determined in the UC Davis studies and the total suspended solids concentrations. The freely dissolved fraction may prove to be of greater value as a predictive correlate of toxicity than the concentration in whole effluent samples has been.

3. The receiving waters (Sacramento River) will also be tested on four occasions. River sampling at one site upstream of the discharge point and one site downstream will be conducted through SRCSD participation in the Coordinated Monitoring Program (CMP). The sampling itself is beyond the scope of this project, and will be the responsibility of SRCSD/CMP, but the samples will be provided to project staff for chemical and toxicity analysis. Chemical analysis for pyrethroids will be performed by SIU using funding provided directly from the Sanitation District, and toxicity testing with H. azteca will be done as described above except that the river water will be tested without dilution (100% only). It is currently anticipated that samples will be obtained during first flush in late 2010, a subsequent rain event in early 2011, and in June and October 2011 (four occasions with two samples each time, plus one field duplicate yielding a total of nine river samples).
4. We have seen toxicity in 100% effluent, and believe much of this is related to pyrethroids, but the proposed work would be important in providing further data to evaluate these findings. If toxicity is observed either in the final effluent or in the river samples, we have developed Toxicity Identification Evaluation (TIE) procedures to help establish if pyrethroids are responsible (Weston and Lydy, 2010). These procedures include piperonyl butoxide addition, low temperature testing, and use of enzymes specifically engineered to hydrolyze pyrethroids. We intend to use each of these procedures, and establish their effect on the EC_{50} of the sample. However, the low temperature test has been found to be the least valuable, and may be deleted if, for example, there is insufficient sample available. The present scope and budget permits application of these TIE procedures on up to two samples.

D. Task 4 - Reporting

Quarterly reports will be provided to the DPR Contract Manager. Oral presentations can be arranged at times mutually agreeable to DPR and UCB. A draft and final report will be provided, which may take the form of one or more manuscripts suitable for submission to a peer-reviewed journal.

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E. Project Timeline

Task 1	**Influent characterization**	
1.1	Influent sampling	12/10 – 12/11
1.2	Sampling of interceptors	12/10 – 10/11
Task 2	**Pyrethroid removal efficiency**	
2.1	Sampling throughout treatment process	12/10 – 12/11
Task 3	**Effluent toxicity and receiving water monitoring**	
3.1	Effluent toxicity testing	12/10 – 12/11
3.2	Effluent TIEs	12/10 – 12/11
3.3	River toxicity testing	12/10 – 12/11
Task 4	**Reporting**	
4.1	Quarterly reports	Quarterly
4.1	Draft Report	3/12
4.2	Final Report	5/12

7. DPR Responsibilities

DPR shall provide, within thirty (30) days of submission by UCB, review and comment on the reports and presentations detailed in Exhibit A, Item 4 of this Agreement.

EXHIBIT B
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BUDGET DETAIL AND PAYMENT PROVISIONS

1. Invoicing

A. For services satisfactorily rendered in accordance with Exhibit A and upon receipt and approval of the invoices by the Contract Manager, DPR agrees to compensate Contractor, in arrears for actual allowable costs incurred as specified herein in Exhibit B, Item 4 of this Agreement. Incomplete or disputed invoices shall be returned to Contractor, unpaid, for correction.

B. Invoices shall include the Agreement Number and shall be submitted in triplicate, not more frequently than monthly or less than quarterly, in arrears, to:

Department of Pesticide Regulation
Attn: Accounts Payable
P.O. Box 4015, MS-4A
Sacramento, CA 95812-4015

2. Budget Contingency Clause

A. It is mutually agreed that if the Budget Act of the current year and/or any subsequent years covered under this Agreement does not appropriate sufficient funds for the program, this Agreement shall be of no further force and effect. In this event, DPR shall have no liability to pay any funds whatsoever to Contractor or to furnish any other considerations under this Agreement and Contractor shall not be obligated to perform any provisions of this Agreement.

B. If funding for any fiscal year is reduced or deleted by the Budget Act for purposes of this program, DPR shall have the option to either cancel this Agreement with no liability occurring to DPR, or offer an Agreement Amendment to Contractor to reflect the reduced amount.

3. Payment

A. Costs for this Agreement shall be computed in accordance with State Administrative Manual (SAM) Sections 8752 and 8752.1.

B. Nothing herein contained shall preclude advance payments pursuant to Article 1, Chapter 3, Part 1, Division 3, Title 2 of the California Government Code, Sections 11256 and 11257.

C. Transportation and subsistence costs shall not exceed rates authorized to be paid UC system non-represented employees traveling within California.

D. Contractor will be reimbursed for direct costs, other than salary costs, that are identified in Exhibit B, Item 4 of this Agreement.

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E. Contractor will bill in arrears for costs incurred during the billing period. If applicable, salary costs will be itemized and billed by position. Documentation supporting specific salary costs will be presented if requested by DPR. Non-wage costs will be billed, in summary, according to general expense categories. A detailed report of transactions will support the billing. Individual expenditures exceeding $500.00 will be supported by a photocopy of the original documentation. Documentation in support of expenditures less than $500.00 will be presented if requested by DPR.

F. Contractor shall not commence performance of work or services until this contract has been approved by the State. No payment will be made prior to approval nor for any work performed prior to approval of this Agreement.Ten percent (10%) of each invoice shall be withheld by DPR until the satisfactory completion of this Agreement.

4. Rates

Rates for these services are as follows:

Table I - Details Budget

7	Total Amount
1. Salaries & Wages	$10,990.00
2. Benefits ①	$2,376.00
3. Travel ②	$500.00
4. Supplies③	$2,134.00
5. Contractual	0.00
6. Minor Equipment④	0.00
7. Indirect Cost⑤	$4,000.00
Total Amount	**$20,000.00**

①Benefits include: Worker's Compensation and other benefits appropriate for title
(NOTE: Student Interns are non-personnel employees with no benefits and shall be excluded from the percentage calculation of this line item.)
②Travel includes: Invoice for payments on travel shall be based on current University of California rates and guidelines.
③Supplies include: Copying services, field sampling supplies, lab supplies, reagents
④Minor Equipment: line item does not include any equipment with a unit acquisition of $5,000 or more.
⑤Indirect Cost: 25% indirect cost rate includes: depreciation of buildings and equipment, utility consumption, operations and maintenance costs, administrative services provided at the departmental and central level, and library costs.

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Table II - Details Personnel

Personnel	Monthly Salary	Number of Months	Percentage Of Time	Total Amount
Weston (Adjunct Professor, Principal Investigator)	$10,711	19	2%	$4,070
Staff Research Associate	$3,698	14	11%	$5,695
Undergraduate Lab. Assistant	$2,450	10	5%	$1,225
Total Personnel				$10,990
Benefits				
Weston @ 30% Staff Research Associate @ 20% Undergraduate Lab. Assistant @ 1.3%				$1,221 $1,139 $16
Total Benefits				$2,376
Total Personnel and Benefits				**$13,366**

5. Cost Limitation

A. The total amount of this Agreement shall not exceed $20,000.00.

B. It is understood and agreed that this total is an estimate and that DPR will pay for only those services actually rendered as authorized by the DPR Contract Manager or his/her designee and in accordance with Exhibit B, Item 4 of this Agreement.

EXHIBIT D
Standard Agreement

SPECIAL TERMS AND CONDITIONS

1. Termination

A. Either Party reserves the right to terminate this agreement without cause upon thirty (30) days written notice to the other Party, or immediately in the event of a material breach. In the event of termination, Contractor shall be paid for all allowable costs incurred up to the date of termination, including any non-cancelable obligations.

B. In the event that the total Agreement amount is expended prior to the expiration date, DPR may, at its sole discretion, terminate this Agreement with 30 days notice to contractor.

2. Subcontracting

Contractor shall perform the work contemplated with resources available within its own organization and no portion of the work shall be subcontracted.

3. Dispute Resolution

A. DPR reserves the right to issue an order to stop work in the event that a dispute should arise, or in the event that the DPR gives the performing agency a notice that this Agreement will be terminated. If DPR exercises this right, the stop-work order will be in effect until the dispute has been resolved or this Agreement has been terminated.

B. Any dispute concerning a question of fact arising under the terms of this Agreement which is not disposed of within a reasonable period of time by agency employees normally responsible for the administration of this agreement, shall be brought to the attention of the Executive Officer or designated representative of each agency for joint resolution.

C. The Contractor shall continue to perform all its responsibilities under this agreement during any dispute until notified to stop work or expiration of this Agreement.

4. Harassment Free Workplace

The Department of Pesticide Regulation (DPR) is committed to providing a safe, secure environment, free from sexual misconduct. It is policy of the Department that employees have the right to work in an environment that is free from all forms of discrimination, including sexual harassment. This policy specifically speaks to freedom from a sexually harassing act that results in the creation of an intimidating, hostile or offensive work environment or that otherwise interferes with an individual's employment or work performance. As a Contractor with DPR, you and your staff are expected to comply with a standard of conduct that is respectful and courteous to DPR employees and all other persons contacted during the performance of this Agreement. Sexual harassment is unacceptable, will not be tolerated; and may be cause for prohibiting some or all of the Contractor's staff from performing work under this Agreement.

EXHIBIT E
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ADDITIONAL PROVISIONS

1. Disposition of Work Product

The Department retains use and non-commercial governmental distribution rights to all deliverables identified in this Agreement in Exhibit A, Item 6. Work to Be Performed.